

CHARTS
FLOW PLANS

PAINT NUMBERED
TREES

PERMANENT
SAMPLES

UNIT
RECORDS

TIMBER
BOOKKEEPING

THE DIAMETER
TAPE

TRIAL
BALANCE

PORT-A-
PUNCH

FOREST CONTROL

by

CONTINUOUS INVENTORY

AB2:
In81
135

"Today I have grown taller from walking
with the trees."

...Karle Wilson

Milwaukee, Wis. June, 1965 No. 135

CAPITAL APPRECIATION SHOULD BE MEASURED

As the woodlands improve
the capital value of the
standing timber increases.
By measuring this capital
appreciation as it accrues
a truer picture of the
profits of woodland man-
agement may be obtained.

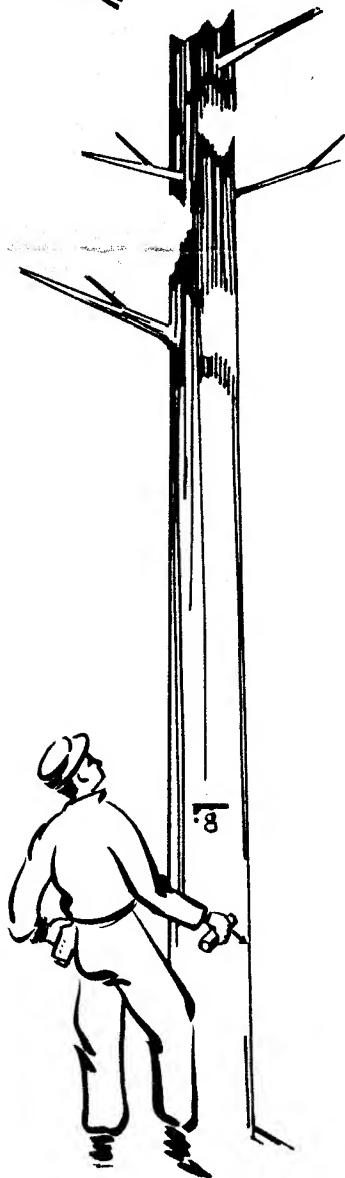
W. E. HILEY, in
A FORESTRY VENTURE

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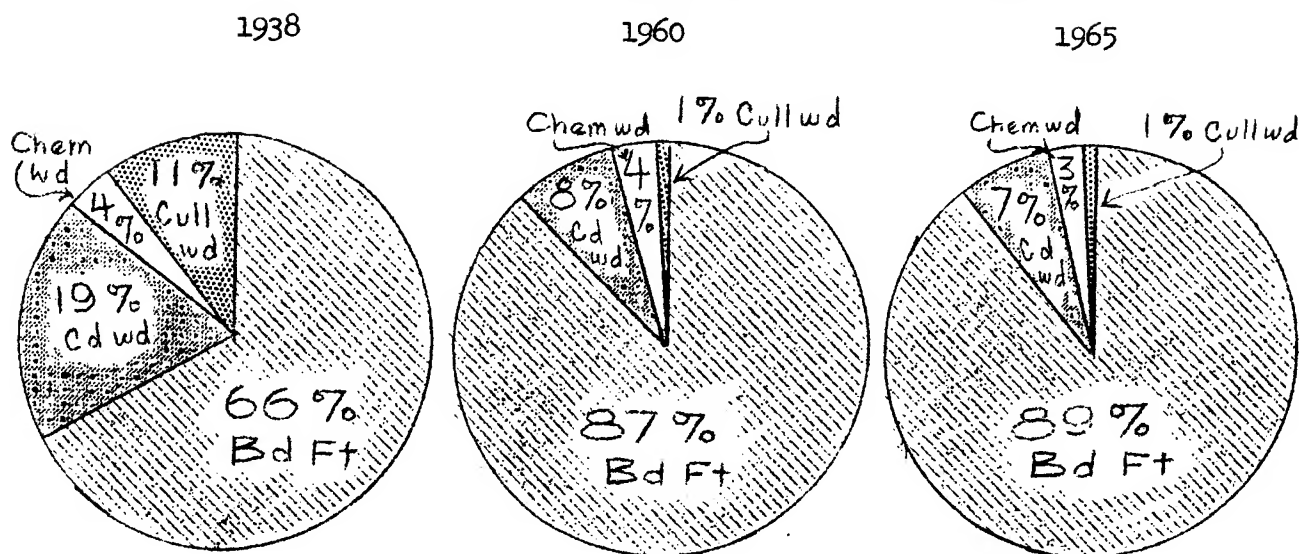
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

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FORD FUND FOREST
A VALUE PICTURE OF PLOTS 41 - 42 - 43
PERCENT OF TOTAL STUMPAGE VALUE BY PRODUCT



PER ACRE STUMPAGE VALUE

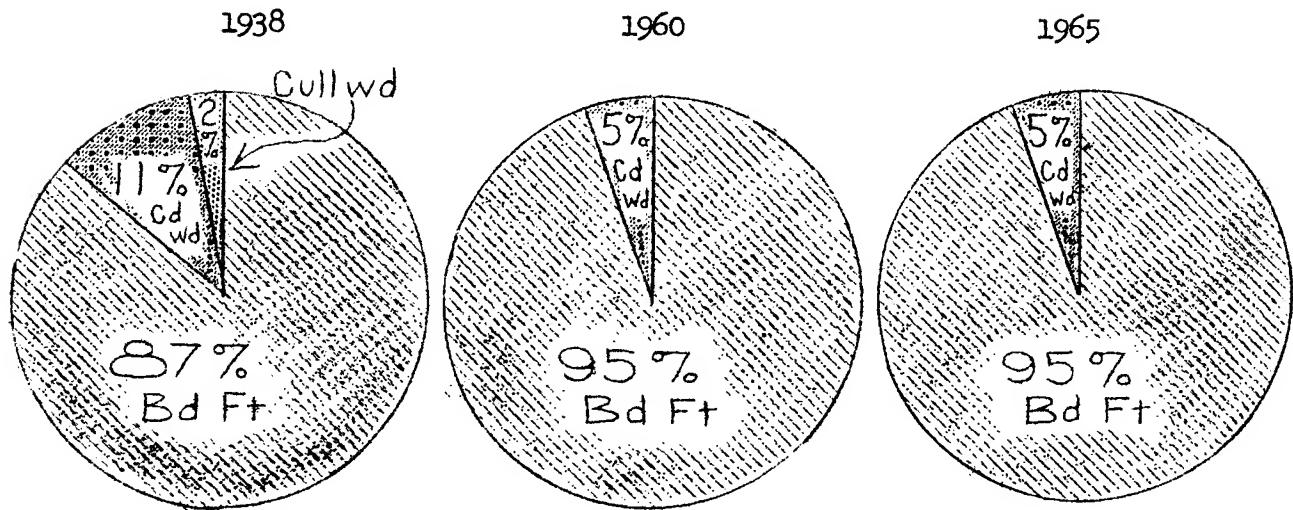
	<u>1938</u>	<u>1960</u>	<u>1965</u>
 Bd. Ft.	\$ 9.28	\$ 85.03	\$113.92
 Cordwood	2.68	7.70	9.25
 Chemwood	.55	3.45	3.57
 Cullwood	<u>1.52</u>	<u>1.05</u>	<u>1.07</u>
Total	\$14.03	\$ 97.23	\$127.81

PER ACRE PER YEAR GROWTH IN STUMPAGE VALUE





	<u>FIRST 22 YEARS</u>	<u>FULL 27 YEARS</u>	<u>LAST 5 YEARS</u>
Bd. Ft.	\$ 3.44	\$ 3.88	\$ 5.78
Cordwood *	.26	.27	.31
Chemwood	.13	.12	.02
Cullwood	<u>-.02</u>	<u>-.02</u>	<u>.00</u>
Total	\$ 3.81	\$ 4.25	\$ 6.11

* SAWLOG INGROWTH TREES - When Cordwood Trees Grow into Sawlog Status, the Growth is a Bd. Ft. Gain. It is not a Cordwood Loss.

FORD FUND FOREST
A VALUE PICTURE OF PLOTS 131 - 135
PERCENT OF TOTAL STUMPAGE VALUE BY PRODUCT



PER ACRE STUMPAGE VALUE

	<u>1938</u>	<u>1960</u>	<u>1965</u>
 Bd. Ft.	\$28.26	\$188.12	\$229.66
 Cordwood	3.43	9.53	11.23
 Chemwood	.08	.63	.72
 Cullwood	.70	.25	.25
Total	\$32.47	\$198.53	\$241.86

PER ACRE PER YEAR GROWTH IN STUMPAGE VALUE

	<u>FIRST 22 YEARS</u>	<u>FULL 27 YEARS</u>	<u>LAST 5 YEARS</u>
Bd. Ft.	\$ 7.27	\$ 7.46	\$ 8.31
Cordwood *	.38	.37	.45
Chemwood	.03	.02	.02
Cullwood	- .02	- .02	.00
Total	\$ 7.66	\$ 7.83	\$ 8.78

* SAWLOG INGROWTH TREES - When Cordwood Trees Grow into Sawlog Status, the Growth is a Bd. Ft. Gain. It is not a Cordwood Loss.

SAWLOG OUTGROWTH TREES - When Sawlog Trees Depreciate into Cordwood Status, the Growth is a Bd. Ft. Loss. It is not a Cordwood Gain.

CFI HELPS IN THE MEASUREMENT OF FOREST CAPITAL APPRECIATION

PART III

The true investment value of forest properties set up for sustained yield management is something for trained economists, investment counselors and forest accountants to establish. I have no intention of meddling in this field, but only to make certain observations relating to economic and physical changes in the forest environment and locale over the years, with particular reference to the part CFI can play in the collection and analysis of the data. A few comments on general economic problems are first in order.

Economic Changes Compared

It is possible to measure and compare changes in economic conditions from past years to the present in terms of the actual dollars of the day.

The projection of economic changes ahead however, requires the application of a price index or adjustment based on past inflationary experience. We have not applied such an index in the case of these CFI data.

In 1938 northern hardwood stumpage prices were very low. Logs were neither sold by grade nor cut for grade in the woods as they are today. Woods run prices prevailed everywhere on the lands of the Ford Motor Company. As shown on the appended listing of stumpage prices, they ranged from only \$4.00 to \$10.00 per thousand board feet.

In 1960 to 1965, logs were sold by grade and stumpage prices were much higher. Factory grade 1 logs often exceed \$100.00 per MBM, and grade 2 logs reach \$35.00 to \$40.00.

When CFI measures volume growth by quality in the woods, the stage is set to realistically compare dollar differences over long periods of time. Differences such as these are capital appreciation. Capital appreciation in this study is a measure of the real gain in value expressed in terms of the 1938 and 1965 dollar.

Stumpage prices by grade remained constant during the last 5 years of the total 27-year period. Price did not increase but tree size and quality did increase and improve. The value growth for this five-year interval of time is therefore a true measure of capital appreciation resulting entirely from the growth of the sawlog trees.

Capital Appreciation in the Ford Fund Forest Plots

Two charts summarizing forest value growth results precede this section. They show that there have been great changes from more than a quarter century of woods growth after selective cutting. They also show that however good the growth of wood, the growth of stumpage price has been greater.'

The pictorial presentation of growth is influenced therefore, by a combination of circumstances and factors, among which these six might be considered of major influence:

1. High stumpage value appreciation over the past 10 to 20 years.
2. No price differential by grade on sawlogs sold in 1938.
3. Premium prices on high grade sawlog timber in 1960-65.
4. Good growth on the residual commercial sawlog stand.
5. High rates of commercial sawlog ingrowth.
6. Good growth from low to high grade sawlog quality.

Improvement in Log Grade a Big Factor in Capital Increment

Quality grade betterment in sawlog timber growth has a massive effect on the value growth or appreciation of capital in the managed forest. This kind of growth varies directly with the condition, size, potential quality and species of hardwood timber left after selective cutting. Table I gives a measured picture of change in wood quality for both heavy and light selective cutting over a period of 27 years.

TABLE I

FORD FUND FOREST

LOG GRADE RECOVERY AND IMPROVEMENT
AFTER HEAVY AND LIGHT SELECTIVE CUTTING

Factory Log Grade	NUMBER OF LOGS PER ACRE			
	Heavy Cut		Light Cut	
	1938	1965	1938	1965
I	0	7	6	17
II	7	17	11	30
III	20	45	21	30
Total	27	69	38	77

Factory Log Grade	BOARD FOOT VOLUME PER ACRE *			
	Heavy Cut		Light Cut	
	1938	1965	1938	1965
I	0	1,679	539	1,908
II	564	1,614	778	2,393
III	610	1,103	1,006	1,599
Total	1,174	4,396	2,323	5,900

* Net Scribner Scale - Hardwoods Only

Analysis of Tabular Results Showing Extent of Log Grade Improvement

Very little timber of high grade was left after heavy selective cutting 27 years ago on the three study plots south of Alberta, Michigan. In spite of this, log grades 1 and 2 increased by $3\frac{1}{2}$ times, and board foot volume in log grades 1 and 2 increased by 6 times. This is a high rate of gain and probably not representative of all heavy selective cutting by the company after 27 years.

Considerable high grade timber was left on the land after light selective cutting on the 5 study plots south of Ravine River, Michigan. Here log grades 1 and 2 increased by only $2\frac{1}{2}$ times, and board foot volume in grades 1 and 2 increased only by $3\frac{1}{2}$ times in 27 years. This reduction in rate of grade improvement after light cutting is a direct result of the high value capital stock left in 1938.

I have no doubt that any forester seeking a lucrative permanent investment in timber would prefer to own this lightly cut stand, which today contains 4,300 board feet net Scribner scale of growing timber per acre in factory grades 1 and 2 logs.

The Rate of Capital Value Appreciation

With every investment in timber land from which it is planned to harvest stock for remanufacture and sale, the owner faces the prospect of continuously varying rates of increment or decrement. Many factors influence these changes. Undercutting, overcutting, catastrophic losses, natural mortality, and the ceaseless growth of millions of trees - all of these conditions constantly work against each other to modify the amount and kind of capital stock present in the forest at any particular time. These factors and many others affect the rate of change in forest conditions. To be adequately informed on these changes, the owner who is determined to keep in touch with his investment finds CFI a useful and economic ally.

CFI has given us rates of capital appreciation on the Ford Forestry Center plots. True, the picture is involved in broad economic factors of change as well as mere growth of wood in volume and quality, but nevertheless, the tabular result in Table II seems worthy of thoughtful analysis.

TABLE II
FORD FUND FOREST
RATE OF CAPITAL VALUE APPRECIATION
AFTER HEAVY AND LIGHT SELECTIVE CUTTING
PER ACRE PER YEAR

Item	FIRST 22 YEARS		FULL 27 YEARS		LAST 5 YEARS	
	Heavy Cut %	Light Cut %	Heavy Cut %	Light Cut %	Heavy : Cut : %	Light Cut : Cut : %
Bd. Ft.	37.1	25.7	41.8	26.4	6.8	4.4
Cord & Chenwood	12.1	11.7	12.1	11.1	3.0	4.6
Cullwood	Loss	Loss	Loss	Loss	0	0
Average	27.2	23.6	30.3	24.1	6.2	4.4

Rate of Capital Appreciation With Inflated Stumpage Prices Unadjusted
The 22-Year and 27-Year Growth Periods

Sawlog capital appreciation rates unadjusted for inflationary trends vary between 26% and 42% per year for light and heavy selective cutting. This simple interest rate of change in dollar value is very high due to included economic factors which bear no direct relation to the growth of wood in the forest. We may say at least, that this is one of several ways of making capital appreciation calculations, and that with it direct comparisons may be made for the 22-year and 27-year periods as shown in Table II. Both of these periods begin with very low stumpage prices and end with almost premium prices due to the demand for high grade sawlogs. It is interesting to note that the given rates for the heavy selective cut exceed those for the light cut by 11% to 16%.

Capital appreciation for all products combined ranges from 24% to 30% and again the rates for heavy selective cutting exceed those for light cutting by 4% to 6%.

Rate of Capital Appreciation With Identical Inflated Stumpage Prices
The Last 5-Year Growth Period

Sawlog capital appreciation rates when stumpage prices are the same at the beginning and ending of the growth period, vary between 4.4% and 6.8% per year. Again, the rate for heavy selective cutting exceeds that for light cutting by 2.4%.

Capital appreciation for all products, including sawlogs, is at the varying rates of 4.4% to 6.3%, with the heavy selective cutting results 1.9% higher than the rates for light cutting.

CAL STOTT
Forester

FORD FUND FOREST STUMPAGE PRICES
USED TO CALCULATE VALUE GROWTH IN ALL SAMPLE PLOTS

Species	Sawlog		1938	1960 and 1965
	Factory	Log Grade	Stumpage Price/MBM *	Stumpage Price/MBM
Hard maple		1	\$ 8.00	\$ 65.00
Hard maple		2	\$ 8.00	\$ 28.00
Hard maple		3	\$ 8.00	\$ 6.00
Yellow birch		1	\$ 8.00	\$105.00
Yellow birch		2	\$ 8.00	\$ 35.00
Yellow birch		3	\$ 8.00	\$ 7.00
Basswood		1	\$10.00	\$ 55.00
Basswood		2	\$10.00	\$ 25.00
Basswood		3	\$10.00	\$ 5.00
Soft maple		1	\$ 6.00	\$ 40.00
Soft maple		2	\$ 6.00	\$ 20.00
Soft maple		3	\$ 6.00	\$ 5.00
Elm, ash & misc.		1	\$ 4.00	\$ 27.00
Elm, ash & misc.		2	\$ 4.00	\$ 14.00
Elm, ash & misc.		3	\$ 4.00	\$ 5.00
White spruce	NOT		\$ 4.00	\$ 15.00 *
White pine			\$ 8.00	\$ 32.00 *
Hemlock	GRADED		\$ 3.00	\$ 7.00 *
N. White cedar			\$ 3.00	\$ 6.00 *

Species	1938	1960 and 1965
	Stumpage Price/Cord *	Stumpage Price/Cord*
N. hardwood cordwood and chemwood	\$.25	\$ 1.00
N. hardwood cullwood	\$.16	\$.25
Aspen and paper birch cordwood	\$ 1.00	\$ 2.00
White & black spruce cordwood	\$ 4.25	\$ 7.00
Balsam fir cordwood	\$ 1.30	\$ 2.25
Hemlock cordwood	\$ 1.15	\$ 2.35
Hemlock cullwood	\$.25	\$.50
N. white cedar cordwood	\$ 1.15	\$ 2.35

* Woods run prices

These stumpage prices have not been corrected for inflationary trends between 1938 and 1965. It was difficult to rationalize a credible price index by log grade. Very few hardwood logs were sold by grade in 1938. Price comparisons numerically and graphically are based on the actual prices received within the Ford Fund Forest in 1938 and during the period 1960 to 1965.